

**ANNEXURE J:
SUMMARY OF SPECIALIST STUDIES**

Rio Tinto

Rössing Uranium Limited

Rio Tinto
Rössing Uranium Limited
Private Bag 5005
Swakopmund
Namibia
Tel: +264 (64) 520 2422
Fax: +264 (64) 520 2556

Compiled by

 **aurecon**

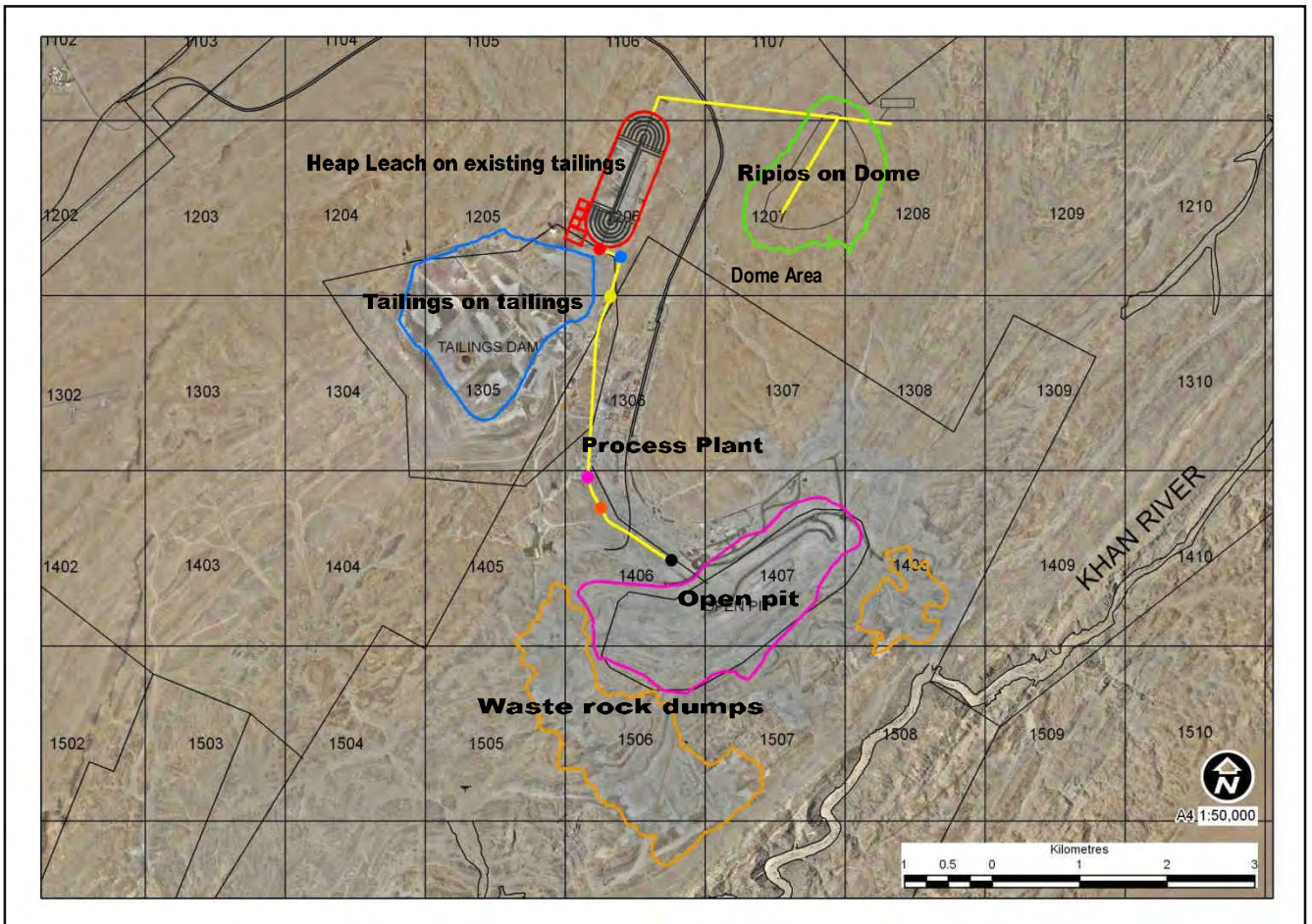
SOCIAL AND ENVIRONMENTAL IMPACT ASSESSMENT
FOR THE PROPOSED RÖSSING URANIUM MINE EXPANSION PROJECT

SUMMARY OF SPECIALIST STUDIES FOR INFORMATION

AUGUST 2010

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Preferred layout of mine expansion activities

INTRODUCTION AND OVERVIEW

Rio Tinto Rössing Uranium Limited (Rössing Uranium) has been mining and processing uranium in Namibia for the past 34 years. It is the third largest uranium mine in the world and in 2009 a total of 54.5 million tonnes (t) of rock was mined producing 4,150 t of uranium oxide.

The last five years have seen a rapid increase in uranium exploration and development in Namibia. Much of this has been driven by the increased world demand for uranium oxide. Although the spot price for uranium has remained volatile due to the effects of the global financial crisis, the long term outlook for this industry remains bright. Hence, Rössing Uranium has focused on extending and expanding its current operations to enable the mine to continue to operate sustainably in the long term.

A Social and Environmental Impact Assessment (SEIA) has thus been commissioned by Rössing Uranium for their proposed expansion project and the Ministry of Environment and Tourism's Directorate of Environmental Affairs (MET:DEA) would need to issue a clearance for such expansion. The clearance would be based on the outcomes of the SEIA, as documented in the various reports that underpin the entire assessment process. A number of specialist studies have been undertaken to investigate the potential impacts associated with the expansion project components and would ultimately inform the overall SEIA. The specialist studies include an impact assessment and suggest measures to mitigate the impacts by enhancing its positive aspects while minimising the negative aspects.

The proposed mine expansion activities include the following:

- ~ Extend the current mining activities in the existing open pit;
- ~ Increase the waste rock disposal capacity;
- ~ Establish a crushing plant;
- ~ Increase the tailings disposal capacity;
- ~ Establish an acid heap leaching facility; and
- ~ Establish a ripios (spent ore from heap leaching) disposal area.

The figure on the previous page indicates the proposed preferred layout of the facilities, following the assessment of the social and environmental, technical and financial feasibility of various layout options. Various layout alternatives regarding the location of waste rock dumps, tailings storage facility, acid heap leach facility and ripios disposal area were considered, as these have the most significant footprint impacts. Sustainable development criteria carried the most weight in the final steps of this process.

A two year process of refining the decision criteria and technical information informing the decision on the preferred layout had the following main objectives:

- ~ To minimise the physical footprint of the proposed expansion;
- ~ To optimise the use of areas where the sustainable development impacts are minimised;

- ~ To find the best practical site for each of the facilities;
- ~ To make the best use of newly impacted sites; and
- ~ To ensure that the expansion follows a strategic life of mine approach.

The following specialist studies were undertaken as part of the SEIA:

- ~ Air quality;
- ~ Archaeology (i.e. heritage);
- ~ Biodiversity;
- ~ Ground vibration;
- ~ Groundwater;
- ~ Noise;
- ~ Occupational health and safety;
- ~ Radiological public dose;
- ~ Socio-economic;
- ~ General solid waste;
- ~ Hazardous solid waste;
- ~ Traffic;
- ~ Visual; and
- ~ Water balance and geohydrology.

A summary of the major findings, potential impact evaluation and key recommendations are provided for each of these specialist studies. Where relevant, each section includes a summary impact table illustrating the significance of the potential impacts without controls and when recommendations are followed.

The summaries were prepared by Aurecon, based on the specialist reports received. The complete specialist reports will be made available for public review following the series of focus group meetings scheduled for mid-August 2010, and will be appended to the final SEIA Report.

AIR QUALITY: AIRSHED PLANNING PROFESSIONALS (PTY) LTD

INTRODUCTION

This study aimed to identify and assess the potential air quality impacts resulting from the mine's operational activities (current and post-expansion) on the surrounding environment and human health. To achieve this, a good understanding of the regional climate, wind regime, the existing sources of air pollution and the contribution towards the resulting air quality is needed.

MAJOR FINDINGS

The types and quantities of pollutants measured provide the baseline information required for the simulation of air quality and dust deposition rates. Emissions from vehicle movement, materials loading and transportation, wind erosion and drilling and blasting activities were quantified for both current and proposed activities. Emissions from on-site stacks (i.e. at the roasters, scrubbers and baghouse) were provided.



Dust emanating from the pit

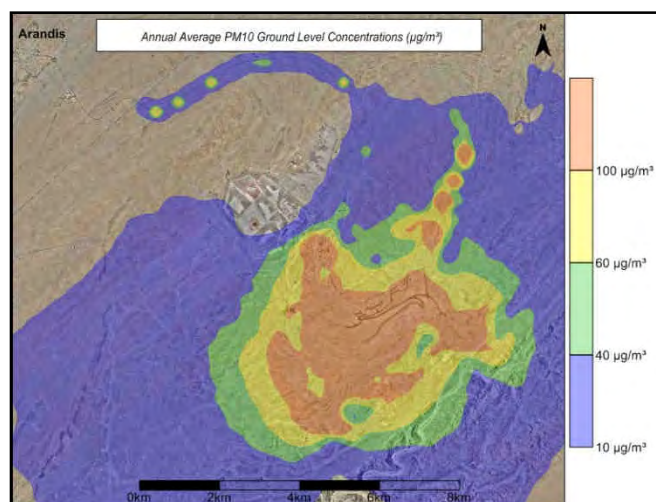
The main pollutant of concern is dust particles suspended in the air, especially smaller particles called PM10. These particles are inhaled via the respiratory system and may impact on human health.

Concentrations of suspended particles in the air were simulated by using dispersion or distribution modelling to ascertain the highest daily and annual average levels occurring as a result of the current and proposed operations. As such, the study evaluated the current scenario and the worst case year within the resultant life of mine.

Air quality guidelines and standards form the basis of effective air quality monitoring and management. These guidelines indicate safe exposure levels to the most common pollutants, such as dust, sulphur dioxide (SO₂) and nitrogen dioxide (NO₂). The application of the standards varies from country to country allowing for a certain number of safe exceedance incidents of each of the standards per year.

Namibia, has adopted the South African air pollution legislation and guidelines. In this study, reference is made to the ambient air quality guidelines from South Africa, the World Health Organisation (WHO), United States Environmental Protection Agency (US-EPA) and the European Council (EC).

The highest predicted PM10 concentrations from emissions from all sources due to the expansion at the mine were calculated. Impacts were assessed at the mine boundary and at the nearest human settlement of Arandis. Concentrations were referenced against the abovementioned guidelines, to indicate compliance or exceedances.



Annual average PM10 concentrations

The study reached the following conclusions:

- ~ The prevailing wind direction is from the north-northeast, also associated with the highest wind speeds. Dominant winds also occur from the north-western, western and south-western sectors.
- ~ PM10 standards are usually quoted in highest daily measurement or annual average values. At Arandis, modelling indicates that measurements for the proposed expansion will comply with the current annual average international and South African standards.
- ~ At the mine boundary modelling results exceed the current South African limits, as well as international standards. This needs to be verified by specific monitoring. Currently nobody resides at the mine boundary.
- ~ Dust fallout directly off-site is within the relevant South African guidelines for residential areas for both the current operations and the proposed expansion.

An assessment of the potential impacts on human health due to particulate matter (PM10) for the baseline operations as well as expansion case is summarised below:

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)
Baseline Operations (human health due to PM10)	High (-)	Medium (-)
Expansion Case (human health due to PM10)	High (-)	Medium (-)
Impact significance sliding scale		
High (+)	Med (+)	Low (+)
Very low (+)	Neutral	Very low (-)
		Low (-)
		Medium (-)
		High (-)

Summary of impact significance

RECOMMENDATIONS

The following recommendations were made to address the findings of the study:

- ~ Dust fallout monitoring should continue in the area due to the proposed expansion activities;
- ~ PM10 monitoring should continue at Arandis to establish emission contributions from Rössing Uranium;
- ~ PM10 concentrations during high easterly wind episodes may be further assessed with updated meteorological data and deposition measurements in the field to obtain more detail and to verify the findings; and
- ~ A dust control product is currently used on unpaved roads, but given the significance of this contribution to dust, the use of alternative products to further reduce the PM10 should be investigated.

ARCHAEOLOGY: QUATERNARY RESEARCH SERVICES

INTRODUCTION

An archaeological field survey was undertaken of the Dome area (refer to figure under the Introduction section) to document all archaeological occurrences with reference to their physical positions, description and significance and vulnerability, given potential development of the ripios (spent ore from heap leaching) disposal facility on the Dome. This survey compliments previous areas surveyed within the Rössing Uranium Mine Licence Area.

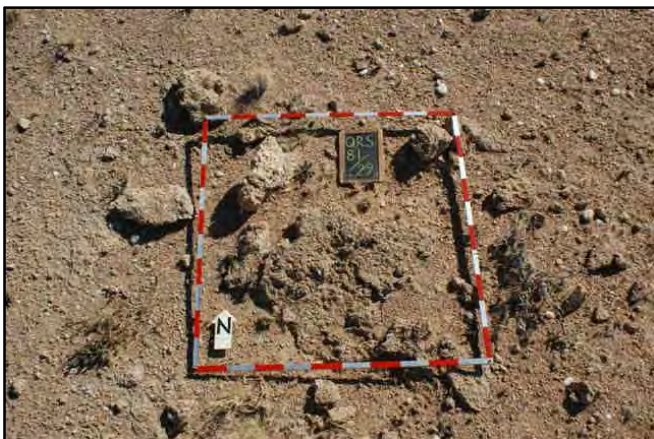
MAJOR FINDINGS

The Dome survey yielded evidence of wild grass seed gathering and honey harvesting. Wild grass seed gathering was a particularly important part of hunter-gatherer subsistence strategies in the Namib during the second millennium AD.

The sites themselves were found to be of minor importance, but a permit is required from the National Heritage Council if the sites are to be damaged or destroyed.

Five archaeological sites were located during the Dome survey. The relatively small size of the four seed digging sites, as well as the fact that they were quite widely spaced, indicates that the Dome area was peripheral to the main focus of seed digging in this area.

The sites are all of low archaeological significance as seed digging sites are very common on the edge of the Namib, and occasionally more than 600 are found in a single square kilometre. The proposed plan to develop mine infrastructure on the Dome will in all likelihood destroy the sites.



Typical seed digging site

IMPACT		SIGNIFICANCE (without controls)	SIGNIFICANCE (with recommendations)					
Destruction of five archaeological Sites		Very low (-)	Very low (-)					
Impact significance sliding scale								
High (-)	Medium (-)	Low (-)	Very low (-)	Neutral	Very low (+)	Low (+)	Medium (+)	High (+)

Summary of impact significance

RECOMMENDATIONS

Impacts on archaeological sites are always irreversible. No specific mitigation measures are suggested, given the overall very low significance of the impact.

A permit from the National Heritage Council will be required before a recorded archaeological site can be destroyed.

BIODIVERSITY: BIODATA

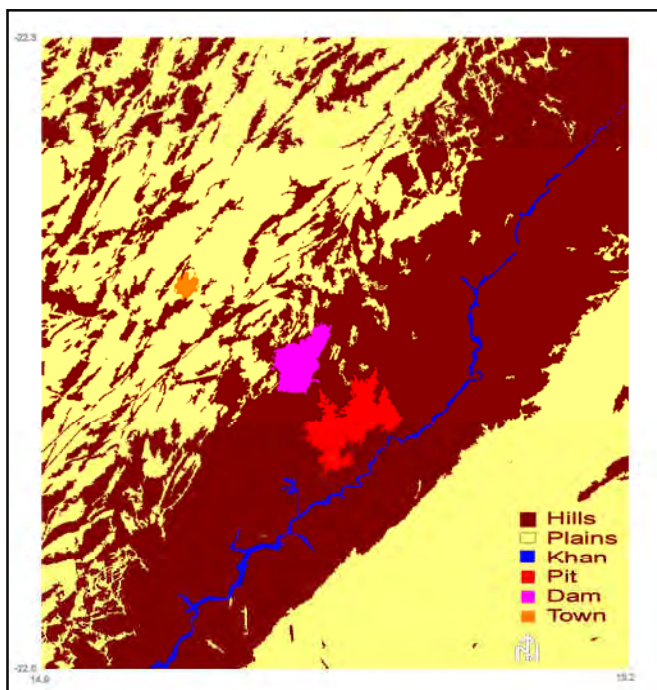
INTRODUCTION

Several previous biodiversity surveys were undertaken at the Rössing mine site to develop a framework for managing biodiversity and assess specific biodiversity risks associated with mine infrastructure development. These surveys covered all areas potentially affected by the proposed expansion project and Environmental Evaluation Associates of Namibia was appointed to review and re-assess all previous work for inclusion in the expansion project SEIA.

Major findings and key recommendations from previous studies are included below, albeit in a slightly different format than other specialist studies.

MAJOR FINDINGS AND KEY RECOMMENDATIONS

Previous studies identified a comprehensive range of species and habitats. High quality information on habitats and biotopes assisted with the fauna assessment.



Biotopes around Rössing

A number of impacts resulting from the proposed mine expansion were identified. Although unlikely, the major impacts include the possible eradication and/or extinction of species occurring in the Dome area. An increase in areas of accumulation of dust around the mining operations, may reduce the productivity of plants and reduce the abundance of soil crust organisms and small invertebrates was identified as a further potential impact.

A number of recommendations were proposed to avoid and minimise the impacts identified.

Recommendation 1: .

- ~ The impacts on the rocky hillsides habitat should be avoided or minimised.
- ~ In future, complementary and simultaneous survey effort should be focused on the sampling areas external to the impact site (20km buffer around the Dome) as well as within it.
- ~ Prioritise biodiversity surveys within the rocky hillside habitat, with the objective of collecting and/or rediscovering the 18 invertebrate species within the critical priority category.
- ~ Place particular focus on discovery of the 4 critical priority spiders only found to date within the rocky hillside habitat.
- ~ Targeted surveys and sampling of areas to be planned and carried out when the best conditions arise, taking advantage of any climatic periods suitable for invertebrate surveys.
- ~ With additional funding available, a list of priority species should be re-analysed and updated on the basis of new work on existing material collected from species which comprise most of the high priority list.
- ~ Institute long-term sampling and monitoring programme to be carried out by Rössing Uranium staff and external specialists for the impact site and for areas outside it, within the rocky hillside habitat, open plains and water courses. Prioritise invertebrate sampling, but design monitoring programme to include all species indicated on the Conservation Concern Priority List.

Recommendation 2:

- ~ Carry out pilot surveys to guide development of long-term monitoring programme on impacts of dust and disturbance on biodiversity outside of expansion impact sites, including roads.
- ~ Identify and select indicator species for long-term monitoring of the impact of dust (5km buffer from operational areas, pits, crushers, dumps and roads).
- ~ Focus monitoring on spider and solifugids, applied to understanding the reasons for the low densities of these species.

Other recommendations:

- ~ During expansion operations, use any opportunities for destructive sampling of habitats and associated studies to inform and add to the existing database on high priority species.
- ~ Where possible, translocate and protect individuals of two plant species of concern (*Adenia pechuellii* and *Lithops ruschiorum*).
- ~ Include the two high priority reptile species (*Pedioplanis husabensis* and *Meroles sp*) in future biodiversity surveys within and external to the impact site.
- ~ Circulate biodiversity information with other mining companies, in order to address the impacts of uranium mining on impacted species with larger ranges.
- ~ Use data from future biodiversity surveys to inform monitoring programme.
- ~ Encourage continued analysis of existing invertebrate material and museum collections from previous biodiversity surveys at Rössing in order to further update and refine the list of species on conservation concern.

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (with recommendations)						
Eradication and/or extinction of species in the Dome area	High (-)	Medium (-)						
Reduction in the productivity of plants, and reduction in the abundance of soil crust organisms and small invertebrates.	High (-)	Medium (-)						
Impact significance sliding scale								
High (-)	Medium (-)	Low (-)	Very low (-)	Neutral	Very low (+)	Low (+)	Medium (+)	High (+)

GROUND VIBRATION: BLAST MANAGEMENT & CONSULTING

INTRODUCTION

In order to address concerns regarding the effects of current blasting operations at the mine and potential additional blasting operations as a result of the proposed expansion, a ground vibration and air blast (high air pressure shockwave due to blasting operations) study was done.

Concerns such as the physical impact of ground vibration or tremors, air blast, fly rock and fumes were evaluated in the study. The effect of the blasting operations on neighbouring private property, such as those in the town of Arandis, the Arandis Airport and structures on farms were assessed.

MAJOR FINDINGS



Blast operation experiment 21 October 2008 (major pit blast)

Two specific blast monitoring exercises were conducted to allow for comparison in the analysis of results:

- ~ Monitoring of a major pit blast on 21 October 2008; and
- ~ Continuous blast monitoring for a period of 27 days on a neighbouring farm.

Major findings are:

- ~ The ground vibration or tremors and air blast levels from blasting operations at the mine are not expected to cause any physical damage to the surrounding buildings, structures and installations, as measured and expected ground vibration and air blast levels are within the allowed norms as per the Rio Tinto and United States Bureau of Mining standards. People may be able to faintly feel and hear the blast vibrations.
- ~ Although the intensity of blasts at the mine will not change as a result of the expansion project, the frequency of the blasts will increase. Although very low ground vibration levels may be noticed, there is no concern that structures or buildings could be damaged as a result of mine blasts.

IMPACT		SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)					
Ground vibration		Medium (-)	Low (-)					
Air blast		Medium (-)	Low (-)					
Fumes		Medium (-)	Very Low (-)					
Fly rock		Medium (-)	Low (-)					
Impact significance sliding scale								
High (+)	Medium (+)	Low (+)	Very low (+)	Neutral	Very low(-)	Low(-)	Medium (-)	High (-)

Summary of impact significance

KEY RECOMMENDATIONS

- ~ The recommendations suggested focus on changing the current blast operations in order to optimise the actual blast process and results. It is proposed that the quantity of blastholes detonating simultaneously should be reduced, blastholes should be stemmed properly with crushed aggregate and it should be ensured that stemming lengths are no less than the minimum required.
- ~ It is further suggested that a monitoring program be implemented to collect data to fill the current gaps in information on the effects of blast operations. Detailed monitoring will provide more information regarding the vibration levels generated for the specific size of the blast and people's experience thereof.

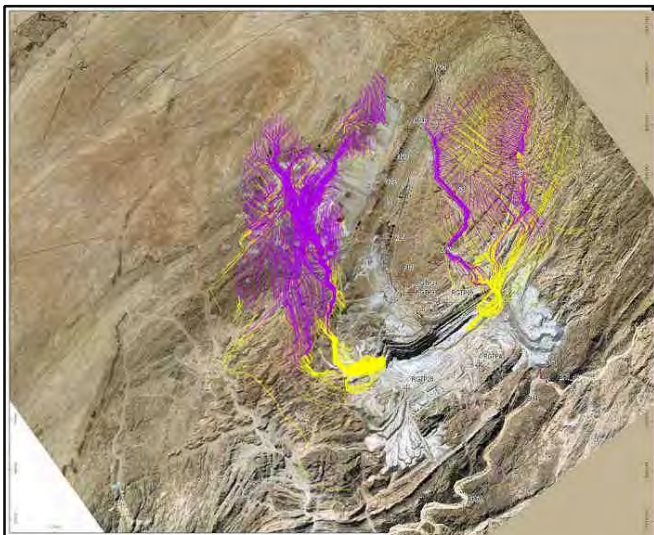
GROUNDWATER: RÖSSING URANIUM

INTRODUCTION

With the introduction of new processing methodologies it needs to be established what potential for groundwater contamination exists and whether the existing control systems need to be upgraded to prevent heap leach, ripios, rock dumps and tailings facilities from potentially contaminating the Khan River.

The new ripios dump would be placed in the Dome Gorge where surface and alluvial water can be controlled by dams and cut off trenches. Potential deeper fracture flow will be diverted by aquifers cross cutting Dome Gorge and draining water into the deep open pit from where it will evaporate.

Groundwater flow paths towards the open pit after 20 years (purple) and 500 years (yellow).



Groundwater flow paths into the open pit

The new heap leach facility would be plastic lined and situated on the current tailings dam. Potential small liner leaks would be neutralised by the underlying tailings sands. The tailings facility itself is adequately controlled by cut off trenches and dewatering wells.

Minor leachate volumes which could leave the rock dumps after rainstorms are controlled by the existing groundwater cut off trenches. Leachate chemistry is currently being characterised and quantified to confirm adequate management.

The existing cut off trenches and dewatering wells will be maintained during operations and closure to control the extended tailings facility.

RECOMMENDATIONS

Ground water control systems in place need to be maintained in operation and new surface seepage collection dams and cut off trenches need to be established in Dome Gorge. Monitoring

boreholes need to be installed to ensure the functioning of the new pumping systems.

For the post closure scenario the establishment of long term passive groundwater filters (passive reactive barriers) need to be investigated to control minor residual groundwater water flow. Continuous pumping after 30 years after closure will not yield sufficient water to allow pumping anymore.

Potential groundwater pollution impacts due to the new infrastructure:

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)
Waste rock dumps	Medium (-)	Medium (-)
Heap leach & plant	Very low (-)	Very low (-)
Ripios disposal facility	Low (-)	Low (-)
Tailings storage facility	High (-)	High (-)

Impact significance sliding scale								
High (+)	Medium (+)	Low (+)	Very low (+)	Neutral	Very low (-)	Low (-)	Medium (-)	High (-)

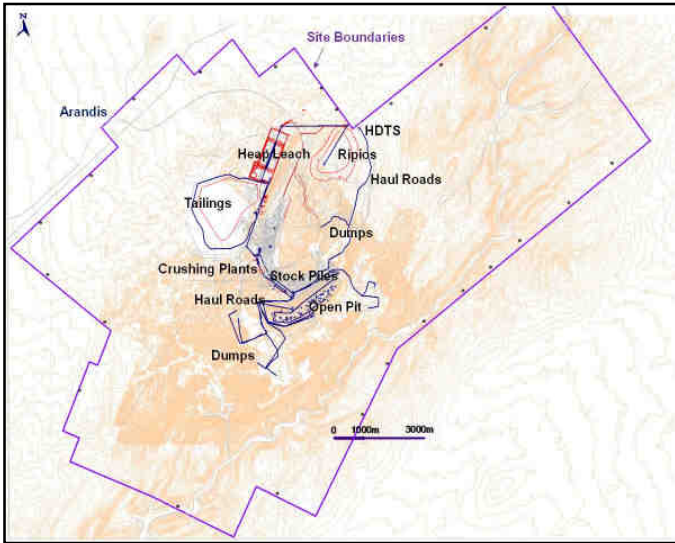
Summary of impact significance

NOISE: DDA ENVIRONMENTAL ENGINEERS

INTRODUCTION

A study was undertaken to establish the anticipated noise levels from the planned operations at the proposed mine expansion. As there are no applicable Namibian National Noise Standards, the noise impact assessment and noise measurements were carried out in accordance with the relevant South African National Standard (SANS) Code of Practice.

MAJOR FINDINGS



Main noise sources of the proposed expansion

Baseline conditions

Baseline conditions revealed that the background noise measurements comply with the recommended standard for rural districts for both daytime and night-time. The only exceptions were Arandis and those areas adjacent to the B2 road, which have noise levels typical of suburban districts with little road traffic, slightly exceeding the standards.

Predicted noise levels

Modelling was used to predict the noise levels around the mining activities and the various facilities and at several places along the mine's site perimeter. The worst-case operational year for the proposed expansion is 2013, given that the maximum volume will be mined then.

Noise levels from expansion

The main conclusions of the study regarding the total noise levels of the existing operations and the proposed expansion were that it is within limits. Night-time noise level at the south-eastern boundary of the site and the daytime and night-time levels at the north-eastern boundary exceeded the guideline, primarily due to the additional conveyor belt to the Ripios disposal site. Currently the nearest residents to the boundary in that direction are more than 10km away. The overall operational noise impact is summarised below.

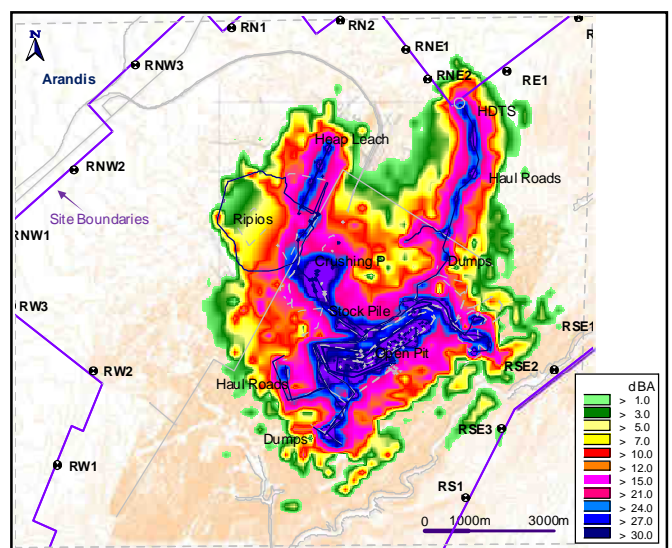
IMPACT		SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)					
Operational phase		Low (-)	Very Low (-)					
Impact significance sliding scale								
High (+)	Medium (+)	Low (+)	Very low (+)	Neutral	Very low (-)	Low (-)	Medium (-)	High (-)

Summary of impact significance

KEY RECOMMENDATIONS

The recommended mitigation measures are the following:

- ~ Environmental noise audits: Should be carried out regularly to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted.
- ~ Buffer zone establishment: The alignment of the conveyor belt to the Ripios should be kept as far as possible from the north-eastern site boundary.
- ~ Equipment noise audits: Standardised noise measurements should be carried out on individual equipment at the delivery to site to create a reference data-base. Regular checks should be carried out to ensure that equipment is not deteriorating and to detect increases in noise which could lead to an increase in the noise impact over time and increased complaints.
- ~ Maintenance of equipment and operational procedures: The occurrence and magnitude of individual noisy events (e.g. silencers on diesel-powered equipment etc) should be reduced.
- ~ Placement of material stockpiles: Material stockpiles should, as far as possible, be placed so as to protect site boundaries from noise of individual operations.



Proposed Expansion Night-time Noise Level Increase

OCCUPATIONAL HEALTH & SAFETY

INTRODUCTION

As part of the SEIA process an occupational health risk assessment has been carried out. It needed to be established whether new equipment, processing plant and chemicals, as well as operational and maintenance tasks related to the proposed heap leach facility would pose unknown risks to workers.

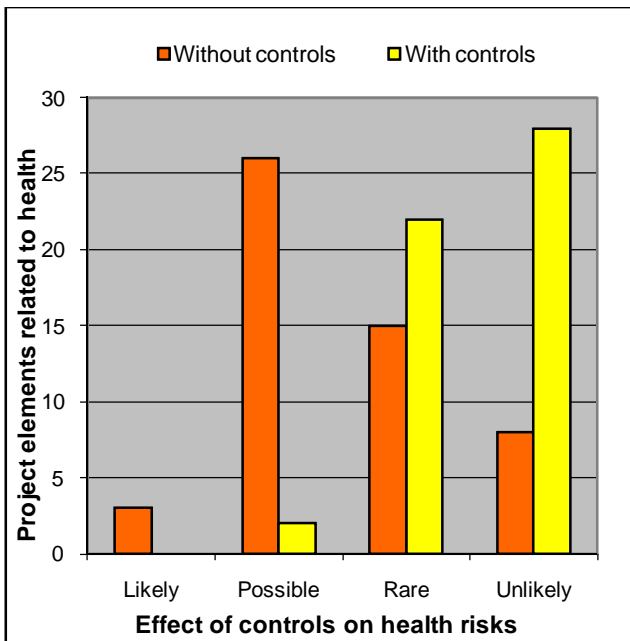
MAJOR FINDINGS

Fifty two elements of the heap leaching operation in the areas of crushing, agglomeration, heap stacking system, leach pads, waste storage area, reagent make up, preparation, storage and dosing system and continuous ion exchange plant were evaluated.

Total radiation exposure to heap leach workers due to a combination of exposure by radon, external radiation and dust was projected to range between 1 and 4 mSv per year and is well within the occupational standard of 20 mSv per year.

Risks identified due to the introduction of new equipment need to be addressed by means of engineering controls and these need to be incorporated into the design of the new equipment. Identified risks related to maintenance and operational tasks need to be addressed by following working procedures already in place at Rössing.

In general the significance of an identified health risk can not be reduced (see high significance rating in the schematic below). However, the likelihood of occurrence can be reduced by the introduction of controls from (on average) possible to unlikely.



Likelihood of occurrence

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)
Occupational health and safety impacts	High (-)	High (-)

Impact significance sliding scale								
High (+)	Medium (+)	Low (+)	Very low (+)	Neutral	Very low (-)	Low (-)	Medium (-)	High (-)

Summary of impact significance

RECOMMENDATIONS

To eliminate any remaining possibility of health impacts monitoring systems and procedures need to be implemented.

The design of engineering controls needs to be requested from the providers of the new equipment (for example dust extraction systems in areas of potential dust generation).

Existing standard operating procedures and safety measures need to be implemented at the heap leach plant.

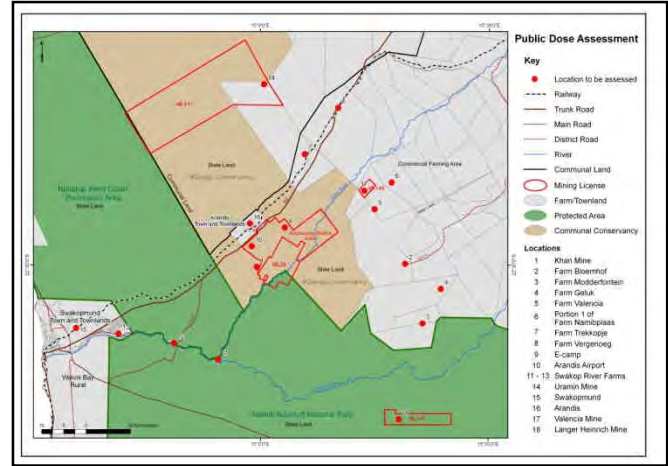
RADIOLOGICAL PUBLIC DOSE: NECSA

INTRODUCTION

A radiological impact assessment was conducted to assess the impact of dust and radon released from the mining activities and from the mine facilities. It also relates the radiological impact of the expanded operations with the impact of the current operations at the mine.

The radiological impact assessment consists of the identification of public groups possibly exposed and the determination of the expected radiation doses to these groups. This is done by conversion of dust and radon concentrations modeled through dispersion modelling. The results are evaluated against international radiological criteria also applicable to Namibia.

The major radiological criterion is the international dose limit for members of the public, which should not be exceeded. The EIA Significance risk is hence ranked as “High” for doses above the dose limit and requires immediate attention. To ensure a safe margin, a more restricted dose constraint is also introduced at Rössing Uranium at a value of 30 % of the dose limit mentioned above. The EIA Significance risk is ranked as “Medium” when doses exceed this constraint for consideration over longer-term planning. For doses below the constraint the EIA Significance risk is ranked “Low”. A dose below 1 % of the dose limit is internationally regarded as trivial and of no concern. In this case the EIA Significance risk is ranked as “Very Low”.



Locations assessed in relation to proposed expansions

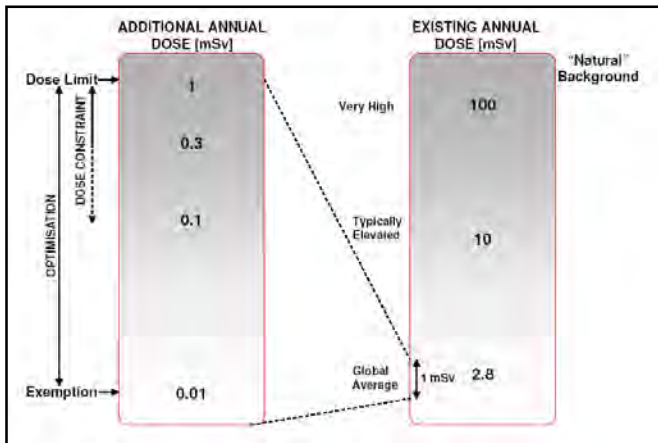
MAJOR FINDINGS AND CONCLUSIONS

The study results still need final verification, particularly in terms of variations in the radioactivity content of some of the materials to be used in the future expansion of the project. Conservative calculations performed to account for such uncertainties, indicate the highest dose from inhalation of dust at the site boundary will be below 30% of the internationally accepted dose limit, while that for a resident at Arandis it will be below 3% of the international dose limit.

International criteria guidance on radon exposure is presently under international review and hence uncertain. Present guidance indicates that radon exposure should be evaluated against separate criteria. Assessed radon doses for Rössing Uranium mine are, however, also below the constraint presented above.

The SEIA Significance risks for dust and radon are hence regarded as “Low” not requiring immediate attention. The same finding applies to the planned future expansion as the assessment does not present any significant increase in the radiological risks due to dust and radon inhalation.

Mitigation options may still reduce these doses further but are not required.



Dose limits and constraints

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)
Dust Inhalation	Low (-)	Low (-)
Radon Inhalation	Low (-)	Low (-)

Impact significance sliding scale

High (+)	Medium (+)	Low (+)	Very low (+)	Neutral	Very low (-)	Low (-)	Medium (-)	High (-)
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Summary of impact significance

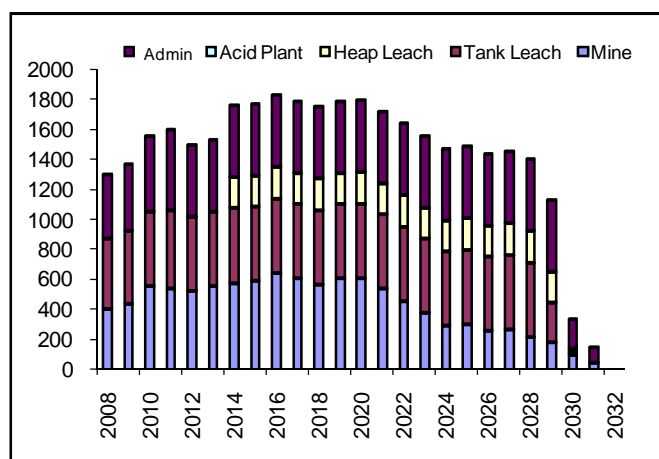
SOCIO-ECONOMIC: MARIE HOADLEY

INTRODUCTION

Most developments and operations, which include extensive mining operations, have certain intended and unintended consequences or impacts on the social make-up (characteristics) and economic conditions of existing communities settled in an area. These potential impacts may be both positive and negative and are studied and documented during Social and Environmental Impact Assessments.

The study identified and assessed a number of potential impacts or changes in the social and economic character of the existing communities in the vicinity of Rössing Uranium's Mine. The major findings regarding the areas of impact, as well as the proposed recommendations are discussed below.

MAJOR FINDINGS AND KEY RECOMMENDATIONS



Number of Rössing Employees between 2008 and 2032

Sustainability of Arandis

The financial strength and independence of the town of Arandis will ensure that it will continue to support and sustain itself even after closure of the mine in the future. Currently the town is financially dependent on and supported by the mine. Initiatives aimed at moving towards financial independence include the phasing out of the mine's property ownership in Arandis and continuing the assistance for capacity building and the support of service providers in the town. The Arandis community should be notified of downscaling and/or closure of the mine as soon as it becomes likely.

Construction camps

If construction camps are located at a sufficient distance from the town of Arandis, disruptions of the existing social, cultural, natural and economic functions of this community may be avoided or minimised. Proper management of these camps will help to create safe and hygienic living conditions.

Employment creation during operational phase

Should the project go ahead, the operational phase of the mine's expansion project will provide an additional 200 long-term

employment opportunities and development benefits. The mine's current recruitment policy creates equitable employment opportunities and the existing skills and capacity development programmes, as well as ongoing training of the mine workforce, will continue to maximise such opportunities.

Public health and safety

Public health and safety programmes are currently being implemented to ensure the health and safety of people. These include programmes to manage dust associated with blasting operations, emergency response plans, monitoring the air quality in the nearby town of Arandis and prior notification of blasting events. It is suggested that a health surveillance programme be developed for Arandis.

Effect of housing on property markets

Property markets may be affected by the requirement for additional housing for the mine's workforce and an inflation in house prices may be experienced in anticipation of this housing demand. This may be avoided by keeping the cost of housing for employees as low as possible and by avoiding the use of property developers and estate agents. It is suggested that houses should be designed to maximise the possibility for post-closure use. A limit on the number of houses owned by Rössing Uranium in Arandis will contribute to the future independence of Arandis.

Effect of housing on Arandis and Swakopmund

The potential shortage of housing in Swakopmund and Arandis may be managed by proper planning to ensure that an increase in workforce at the mine will be accommodated. Suitable temporary accommodation for rent may be identified and the provision of housing in the Progressive Development Area in Swakopmund and the provision of mobile homes may be considered. This will ensure the least disruption of family units as employees will be able to bring their families along. With such measures in place, social and community processes may subsequently only be slightly altered in local communities.

Local economies

Local and regional economies will be positively impacted by increased spending by Rössing Uranium and its workforce. The local economies will benefit from this expansion and growth may be further encouraged by adopting a policy of local procurement to promote small, Namibian companies and encourage their diversification. In the event of downscaling or closure, service providers should however be advised well in time.

Inward migration

Unemployment levels in Namibia are high. It is therefore expected that inward migration of work seekers to Erongo Region will increase as a result of the perceived job opportunities offered by the mine. The study concluded that there is no real management intervention that can stem inward migration. The impacts of such an influx of job seekers (e.g. backyard shack dwelling, informal

housing and the resultant health and social problems) could possibly be alleviated by a number of social support initiatives. These include measures such as the promotion of private ownership, support to the Arandis Town Council to upgrade state health services and implementation of social and health care programmes which include prevention of diseases such as tuberculosis, alcohol abuse and violence against women and children.

Social services

Future planning initiatives should consider the mine's general social responsibilities and pro rata contribution towards alleviating the shortage of educational facilities which ultimately is the cumulative responsibility of all the mining companies operational in the area. With current capacity, the schools in Swakopmund and Walvis Bay may not be able to accommodate the schooling requirements of an enlarged Rössing Uranium's workforce.

Traffic

Increased road use by the mine for transport of the larger workforce to and from the mine could potentially impact on the safety of road users. This impact was assessed in the Traffic Impact Study and found to be of very low significance. A number of recommendations were made to manage this issue.

Water

It is prudent that an alternative source of water to the Omdel supply be identified, as the Erongo Region could experience a water shortage as a result of the mine's expansion and may breach the limits of sustainable development.

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)						
Sustainability of Arandis.	High (-)	Medium (+)						
Employment creation – construction	Medium (+)	Medium (+)						
Construction camps	High (-)	Neutral						
Employment creation – operational	Medium (+)	High (+)						
Public Health & Safety	Medium (-)	Low (-)						
Housing (on property markets)	Medium (-)	Low (-)						
Housing (on Arandis & Swakopmund)	High (-)	Medium (-)						
Local economies	Medium (+)	High (+)						
Inward Migration	High (-)	High (-)						
Social Services	High (-)	Medium (-)						
Traffic	Medium (-)	Low (-)						
Water	High (-)	Neutral						
Impact significance sliding scale								
High (+)	Medium (+)	Low (+)	Very low (+)	Neutral	Very low (-)	Low (-)	Medium (-)	High (-)

Summary of impact significance

TRAFFIC IMPACT ASSESSMENT: BURMEISTER & PARTNERS (PTY) LTD

INTRODUCTION

In response to concerns related to road safety and the potential impacts a detailed traffic impact assessment and road safety audit were done of the expansion of the mine’s activities on the local roads and transport networks in the mine’s operational area. Factors such as the expected future growth in background road traffic and the transportation of staff and materials associated with the proposed mine expansion were considered.

MAJOR FINDINGS

The B2 road between Walvis Bay and Swakopmund (coastal road) and Swakopmund and Rössing Mine is well known for its high traffic volumes, especially heavy vehicles, and general safety concerns. It is predicted that the expansion of the mine will increase traffic by approximately 30% and background growth will further increase traffic on the road. This prediction is based on actual historic counts, which was extrapolated to define the background traffic. By using the expected percentage increase in the number of employees by 2011, an increase in traffic volumes was calculated. A traffic engineering simulation program was used to determine the degree of impact on the operation of the intersections under different traffic conditions. The road safety audit found that the expansion in the mine’s operations will not contribute to an increase in the safety risk associated with travelling on the routes, if the commuting staff makes use of a safe and efficient bus system. The audit identified a number of major road safety deficiencies related to road markings and traffic signs (faded or incorrectly used) and safety features (clearing line of sight and incorrect provision of guard rails). Law enforcement and education should form part of a strategy to improve unsafe overtaking practices.

Road network, road traffic management and road safety



Recommended new road to upgrade the Rössing/Arandis intersection on the B2

The study concluded that the existing road system has the capacity to accommodate the projected increase in traffic volumes. Certain

intersections were however identified for improvement, namely the Rössing Uranium/Arandis intersection with the B2 and the B2 T-junction with road C34 (the road behind the dunes).

Staff transport demand and rail passenger transport option

Although the existing railway network has the capacity to provide transport to additional mining employees, this option is not practically feasible due to frustrations associated with low operational speeds and the delays in travel times, due to the absence of signalling on the network. Additional buses will therefore be required to transport staff. It is expected that a total of 5 buses will initially be required which will increase to 8 buses when the maximum number of staff is reached.

Emergency response and evacuation

The mine’s current emergency response and evacuation support systems were assessed and found to be sufficient.

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)
Road network	Medium (-)	Low (-)
Transport of staff	Medium (-)	Very low (+)
Emergency evacuation	Medium (-)	Low (-)

Impact significance sliding scale

High (+)	Medium (+)	Low (+)	Very low (+)	Neutral	Very low (-)	Low (-)	Medium (-)	High (-)
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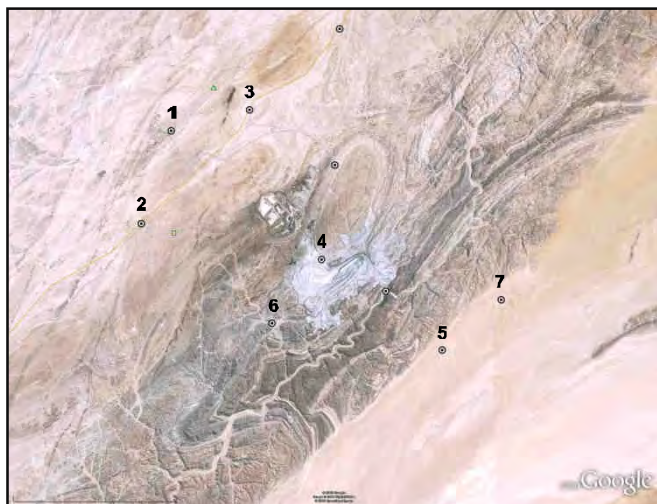
Summary of impact significance

KEY RECOMMENDATIONS

- Key recommendations to mitigate the predicted impacts are:
- ~ The Rössing Uranium/Arandis intersection with the B2 can be improved to better accommodate an increase in traffic by changing the layout (e.g. by construction of a new road from the south to form a new T-junction with the B2 to prohibit all right-turning movements and limit users to left-turn movements only.
 - ~ Other intersections and accesses on to the B2 need to be upgraded to optimal functionality, especially the B2 T-junction with the C34 (dune road).
 - ~ By upgrading the C34 to a bitumen standard, heavy vehicle traffic may be channelled away from the town of Swakopmund.
 - ~ The findings and recommendations of the Road Safety Audit should be presented to the relevant authorities and their commitment to an implementation plan obtained.
 - ~ The safety, cost and convenience of bus transport outweighs the benefits of switching to rail transport. It is recommended that the B2 route rather be upgraded to benefit not only mine staff, but road users in general.

VISUAL: VRMA CC

INTRODUCTION



Viewpoints assessed

This study assessed the proposed landscape changes to analyse potential visual impact of the proposed expansion project facilities, but specifically including lights at night and the visual impact of increased blasting.

The objectives of the visual impact study are to inform Rössing Uranium and the decision makers of the visual implications of current and proposed mining operations to the surrounding sense of place, as well as to demonstrate the advantages of mitigation strategies to reduce the impact of the proposed landscape changes as a result of the mine expansion.

MAJOR FINDINGS

The new ripios dump and extended tailings dam will be visible from the B2 national road and Welwitschia Flats.

Due to the long period of time that the Rössing mine has been operational, the sense of place of the site itself has already been significantly impacted upon by landscape changes over the years.

The landscape of surrounding areas such as the Khan River and Welwitschia Flats in particular, remains largely intact. In this light, changes associated with the further expansion of the mine have a lower significance rating.

Based on the detailed study which included 3D modelling of different facility layout options, the overall visual impact associated with the mine expansion from all the viewpoints is summarised in the table below.

Mining activities have been established in Erongo Region over the last century. Against this background a number of key regional visual issues are significant for Erongo Region:

- ~ The total combined visual impacts of existing and proposed large scale mining operations in areas of significant desert landscape character need to be addressed. It is no longer feasible to assess potential impacts on the basis of a single operation, nor can these impacts be assessed on the basis of one operation's activity.
- ~ The potential of the total combined visual impact of mining in the region affecting the tourist industry is high. The region has a scenic landscape character which contributes to the sense of place of the Namib Desert. It is vital that the combined effects of the mining industry do not start to dominate the natural landscape features.
- ~ The total combined implications of mining on the landscape may have an effect on the Erongo Region tourism economy.

The viewpoints are the surrounding locations from where the proposed landscape changes are assessed. These may be a single point of view or a linear view along a road. The aim of the study is to determine whether the landscape changes will be visible or not from the various viewpoints.

NR	VIEWPOINT	TYPE OF ACTIVITY
1	Arandis	Residential
2	B2 Eastbound	National Road
3	B2 Westbound	National Road
4	Khan River Valley	Nature / Wilderness recreation
5	Namib Naukluft Park	Wilderness/Conservation
6	Panner Gorge	Wilderness and recreation
7	Welwitschia Flats	Wilderness/Conservation/Agriculture

List of viewpoints with descriptions

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)
Expansion visual impact	High (-)	Medium (-)

Impact significance sliding scale

High (-)	Medium (-)	Low (-)	Very low (-)	Neutral	Very low (+)	Low (+)	Medium (+)	High (+)
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Summary of impact significance

KEY RECOMMENDATIONS

A number of mitigations are proposed to effectively reduce the overall visual impact:

Waste rock dumps

- ~ To be designed within the defined height specifications.
- ~ Dumps need to be rounded.

Blast plume

- ~ Blasting should take place in the afternoon when the atmospheric haze is more intense, and on preset days.
- ~ It is recommended that blasting times are co-ordinated with other mines to ensure that the total combined impacts of blasting are reduced.

Ripios

- ~ Strict dust control measures must be implemented to ensure that dust generated during the stacking process is limited.
- ~ The outer edges need to be smoothed off so as to create a more rounded shape.

Lights at night

- ~ External lighting must use down-lighters shielded in such a way as to minimise light spillage and pollution.

Tailings storage facility

- ~ A dust suppression process must be implemented.
- ~ During operation the outer edges of the facility need to be rounded off.
- ~ To reduce the light impact of the ripios stacker, lighting reduction design and technologies should be assessed. The aim should be to reduce the source light generated by the stacker operating at night from any prominent location.
- ~ Overly tall light poles are to be avoided. No naked light sources are to be directly visible from a distance (except for the aircraft warning lights) and only reflected light should be visible from outside the site.



GENERAL WASTE: PASCO WASTE & ENVIRONMENTAL CONSULTING CC

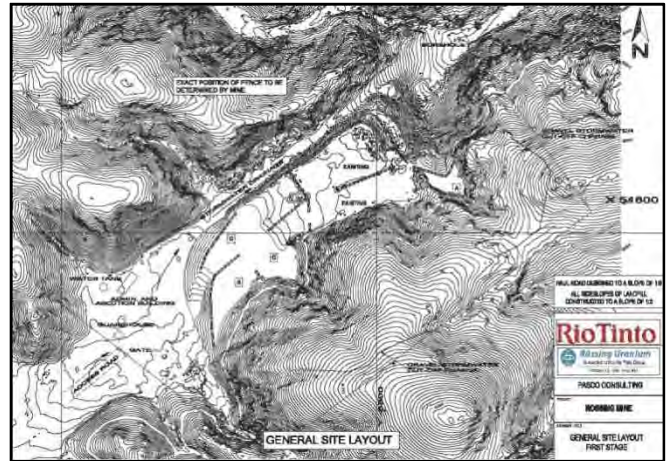
INTRODUCTION

An existing landfill is currently being used for the daily disposal of general household waste emanating from the mine, but a need for additional landfill space in the near future has been identified. In order to address the shortage of landfill space, a guideline was developed to set out the general operation and maintenance procedures. In addition to the introduction of an operation’s manual, certain extensions to the existing landfill site is also proposed to create additional landfill space. The operation and procedural manual describe the current site conditions, site facilities and site preparatory works, keeping of records and landfill monitoring and health and safety matters.

MAJOR FINDINGS

The waste to be disposed of at the extended landfill will generally consist of wood, plastic, paper, metal, textile, sand/stone and dust and are considered general household waste.

Possible environmental impacts of the landfill facility were identified and assessed and the requisite mitigation measures to address these impacts are provided.



General site layout

The recommendations listed incorporate the management actions identified in the report. The aim is to mitigate potential negative impacts arising from the construction and operational phases and, where possible, optimise the benefits.

The following recommendations relating to the construction and operation of the landfill were made:

- ~ The extended site layout should be implemented, but in order to prevent habitat destruction, the area of construction and operation should be confined to the smallest possible space and well-defined access roads established.
- ~ Implement management actions to mitigate the visual impact of windblown materials carried from the proposed waste disposal site, including daily cover of the waste, the use of moveable litter screens and regular clean ups in and around the site.
- ~ Implement management actions to mitigate odours generated by waste materials, such as daily cover and not disposing waste under wet conditions.
- ~ Implement management actions to reduce occupational health and safety risks at the waste disposal site, including the protection and use of the required personal protective equipment and improvements to the current emergency response plan.
- ~ Manage and control vectors of disease through compaction and application of daily cover.
- ~ Regularly monitor the new system to ensure that it is working efficiently.

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (following recommendations)
Pollution of ground and surface water	Very low (-)	Very low (-)
Siltation of streams due to exposed surfaces	Very low (-)	Very low (-)

Impact significance sliding scale

High (+)	Medium (+)	Low (+)	Very Low (+)	Neutral	Very low (-)	Low (-)	Medium (-)	High (-)
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Summary of impact significance

RECOMMENDATIONS

HAZARDOUS WASTE: PASCO WASTE & ENVIRONMENTAL CONSULTING CC

INTRODUCTION

Presently certain types of presumed hazardous wastes, including used oils and grease are being transported for disposal at Walvis Bay for disposal at the municipal hazardous waste landfill.

The proposed expansion will result in the generation of higher volumes of solid waste, including hazardous wastes, potentially rendering the construction of a hazardous waste disposal landfill site on the mine feasible. This specialist study focused on the potential impacts associated with the establishment of such a hazardous waste landfill, and provided a conceptual design and costing thereof to serve as a basis for further investigation.

MAJOR FINDINGS

In the absence of Namibian legislation, the South African solid waste guidelines were followed to determine the correct category of landfill required, select appropriate disposal sites and to later inform the design, operation and monitoring the landfill site.

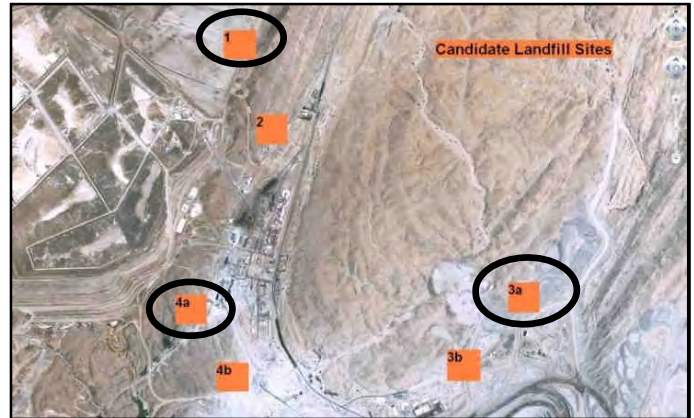
A landfill is classified according to the potential environmental and health risks by consideration of factors like waste type, size of the landfill operation and potential for significant leachate (polluted water percolating through the waste body) generation based on the difference between precipitation and evaporation.

This study was restricted to hazardous waste which, because of certain properties, poses a threat to human health or the environment, such as:

- ~ Risk of explosion or fire;
- ~ Acute or chronic toxicity, damage to ecosystems or natural resources, accumulation in biological food chains and persistence in the environment;
- ~ Chemical instability, reactions or corrosion; and
- ~ Causing cancer, mutations or birth defects.

Rössing Uranium’s procedures forbid the disposal of such contaminated waste on its existing domestic waste disposal site. Radioactive waste does not fall into this category and may not be disposed of on a hazardous waste landfill and will have to be disposed of in the mine tailings storage facility as per the current practice for such wastes generated.

Potential landfill sites were identified within the already disturbed mining area and preliminary findings indicate suitable sites exist. The study also describes a conceptual design for the hazardous waste facility. This design will meet the disposal need and incorporates the necessary precautionary measures to mitigate possible environmental impacts.



Candidate Hazardous Waste landfill sites investigated, with the highest ranking sties to be investigated further circled

IMPACT	SIGNIFICANCE (without controls)	SIGNIFICANCE (with mitigation)
Pollution of ground water	Low (-)	Very low (-)
Odours from landfill	High (-)	Low (-)
Danger to health & safety of workers	High (-)	Low (-)

Impact significance sliding scale								
High (+)	Medium (+)	Low (+)	Very low (+)	Neutral	Very low (-)	Low (-)	Medium (-)	High (-)

Summary of impact significance

KEY RECOMMENDATIONS

Based on the conclusions, it is recommended that:

- ~ The development of a future hazardous waste disposal facility for hazardous and “inactive” radioactive waste should be considered.
- ~ In finalising the selection process of the site, the top ranked sites should be investigated in more detail and selection will be informed by more detailed site-specific information and operational requirements.
- ~ Although it is considered highly unlikely that leachate would be generated, leachate management would be mandatory due to the category of the facility.
- ~ The use of a composite, multilayer waste cell lining systems is required against the absence of suitable natural clays for the purpose of liner construction to seal the site from the environment.

WATER AND ENERGY RESOURCE USE: RÖSSING URANIUM

INTRODUCTION

Water

The current source for Rössing water is the Omdel aquifer.

Recent figures on groundwater levels of the Omdel aquifer indicate a deterioration to extend that renewal of the abstraction permit at existing rates is unlikely. The capacity of the Kuiseb scheme is being expanded but the potential rate of expansion may not match the decrease in the Omdel scheme.

Through a group action under the auspices of the Uranium Stewardship Committee, Rössing is cooperating with the other operating mines and the exploration groups that are in different stages of development of their projects to facilitate and expedite the development of increased desalination facility by NamWater to replace the groundwater resource.

Although assurances have been received from the Ministry of Agriculture, Water and Forestry that supply to existing consumers will not be reduced without alternative sources, it is foreseen that this additional desalination capacity may take some years to develop. An interim arrangement is being negotiated to access surplus water from an existing desalination plant situated approximately 40km north of Swakopmund.

The mine's existing annual water demand varies from 3.5 to 4 million m³ and is expected to increase to 6 million m³ per annum when the additional demand created by the heap leach facility is considered.

Power

The existing electricity demand of Rössing is 35 MVA for the Tank Leach operation with an additional demand of 22 MVA estimated for the Heap Leach operation.

Power is supplied by NamPower from the national grid via a link to the 220 kV line between Omburu – Khan and Walmund substations. This line supplies power to Walvisbay, Arandis, Swakopmund as well as Rössing. A ring feed also exist in order to allow a dual feed to the region inclusive of Rössing.

Rössing is currently tying into the NamPower grid connecting Omaruru to Swakopmund. Substations feeding this line are Omburu (Omaruru), Khan and Walmund (Swakopmund) substations, whereby Rössing connects to the grid between Khan and Omburu into the grid. Capacity of the existing grid is currently being upgraded between Omburu and Khan to make provision for the capacity required by Trekkopje mine and desalination facilities. The capacity of the grid between Khan and Walmund is a 215 MVA line and are sufficient to interconnect Rössing into this line.

MAJOR FINDINGS

Water

Escalation in mining activities in the region has led to an increase in water demand. Due to the lowering in groundwater levels of the major aquifers and the likelihood that the current abstraction permit may not be renewed, a sustainable alternative source to groundwater for existing and expanded operations had to be considered.

The use of desalinated water is currently being explored and may be supplied from the existing Erongo Desalination Corporation or NamWater Desalination plant. This plant is located approximately 40 km north of Swakopmund and will be able to supply water into the existing NamWater distribution network.

The development of a second desalination plant is also being considered and will be a joint effort between mining companies and NamWater.

Power

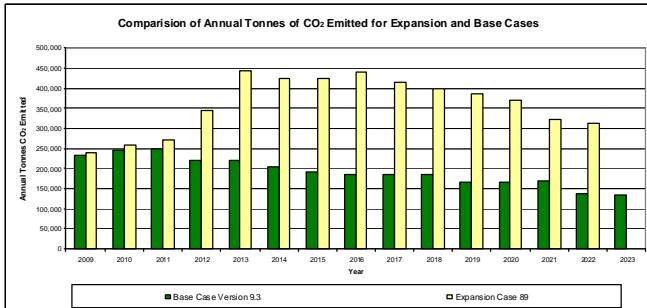
Rössing is interconnected to the NamPower grid by means of two 40MVA (220kV:11kV) transformers. The expanded demand required for HL requires a provision to be made in the existing main substation for an additional incoming feeder. For expansion purposes an additional 40MVA feed in parallel to the existing transformers is provided. This will provide a total feed-in capacity of 80MVA. Switchgear, protection and high voltage interconnection on NamPower side will also for part of the upgrade. The existing NamPower yard provides space for the additional transformer and equipment to be installed.

The heap leach operation is divided into 3 main electrical distribution areas namely Crushing, Processing and Ripios Disposal. The new infrastructure will be located in close proximity of the following existing infrastructure: Primary Crushing close to existing Primary Crushers same for Secondary Crushing and Heap Leaching & Processing located on top of existing tailings facility.

Minimum backup generation is required as all the process storage ponds and facilities have been provided for a crash stop. Since the existing backup generation facility has been recently upgraded and as result surplus backup generation capacity exists, provision has been made only to link this to supply limited backup power to the heap leach.

Green house gas emissions

The green house gas contributions due to Rössing Mine expansion will double. The base case operations, assuming no expansion is illustrated with the green bar chart. With proposed activities the total calculated CO₂ emissions in illustrated with the yellow bar chart.



Annual CO₂ emissions due to Basecase (2010) and Expansion Case (year 2013)

The estimated carbon dioxide emissions from Rössing Mine for current operations for the year 2010 are ~0.258 million metric tons per year. This should be seen in the perspective of the annual Namibian and global emission rate of green house gases, which is ~2.83 million metric tons and 30 176.7 million metric tons, respectively expressed as carbon dioxide (CO₂) equivalent. Rössing Mine’s emissions therefore contribute approximately 9.1% of Namibia’s green house gas emissions and 0.0009% of global green house gas emissions.

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